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NTEK SYSTEM

USE CASE

Circulating water pumps

SV500 by NTEK SYSTEM | ESA-based condition monitoring & predictive maintenance

OVERVIEW

Circulating water pumps supply cooling water to the condenser, and auxiliary cooling water pumps supply cooling water to the heat exchangers of the plant's equipment. In this scenario SV500 measures and analyzes the three-phase voltage and current signals of the pump drive motors with PTs and CTs in the electrical room to diagnose the condition of the pumps and motors.

PROBLEM

Cooling water pumps run continuously during generation, so a way to check their condition without stopping them is needed.

- **Inspection that requires a shutdown** - At the Zolling coal-fired power plant in Germany, the motor of a 1,600 kW high-voltage motor critical to the cooling water supply had to be stopped and measured every year to check the winding condition.
- **Hidden causes of performance loss** - Even when pump performance drops, vibration, pressure and flow checks alone may not reveal the cause. In an auxiliary cooling water pump case at a US nuclear power plant, ESA measurement during operation identified flow turbulence as the cause.

EXPECTED OUTCOMES

The condition of cooling water pumps can be checked without stopping them, and maintenance can be planned.

- **Early detection of potential failures** - Detects potential failures early to minimize unexpected incidents and risk.
- **Optimized maintenance schedules** - Diagnostic data helps predict and optimize maintenance schedules.
- **Lower cost and downtime** - Higher operating efficiency helps reduce energy consumption, maintenance cost and downtime.

TARGET EQUIPMENT

Circulating water pumps

Auxiliary cooling water pumps | Pump drive motors

SOLUTION

SV500 uses ESA to analyze the electrical signals of cooling water pump drive motors and diagnose pump flow abnormalities and motor and drive faults during operation.

- **Pump flow abnormality detection** - Detects flow turbulence and cavitation in the pump, and blade and vane damage.
- **Motor and drive diagnosis** - Detects bearing problems, shaft misalignment, mechanical unbalance, soft foot, winding insulation degradation, ground leakage current and load-related problems.
- **Power quality monitoring** - Analyzes voltage sag/swell, total harmonic distortion (THD) and voltage and current imbalance in real time to identify equipment impact and abnormal conditions caused by poor power quality at an early stage.
- **Adaptive thresholds** - Machine learning learns the normal state of each asset and judges condition with thresholds that adapt to load. Criteria matched to each asset and load condition are applied instead of fixed thresholds.
- **Web dashboard and data integration** - The equipment web server dashboard shows status per diagnostic parameter in real time, so condition can be checked without a site visit, and data can be integrated with upper-level systems over Modbus RTU, Modbus TCP, MQTT and RESTful API.

SUMMARY

SV500 analyzes the voltage and current signals of circulating and auxiliary cooling water pump drive motors with ESA to detect abnormalities in pumps and motors, such as flow turbulence, cavitation and bearing problems, early without stopping the equipment.

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